

IN THE SPECIFICATION:

Please amend the specification as follows:

Please amend the paragraphs beginning on page1, line 13 through page 2, line 22as follows:

As a copyright protection method ~~upon used in~~ distributing digital data such as image data, audio data, and the like on the Internet, digital watermarking attracts a lot of attention. Digital watermarking is a technique for embedding information so as to be imperceptible to a human being. For example, as a digital watermarking technique for a multi-valued image, various methods that exploit the redundancy of the density values of multi-valued pixels are known.

On the other hand, a binary image such as a document image has small redundancy, and it is difficult to apply the digital watermarking technique to such an image. However, some digital watermarking methods that exploit unique features of document images are known. For example, a method of shifting the baseline of a line (e.g., see Japanese Patent No. 3,136,061), a method of manipulating an inter-word space length (e.g., see U.S. Patent No. 6,086,706 and Japanese Patent Laid-Open No. 9-186603 (U.S. Patent No. 5,861,619)), a method of manipulating an inter-character space length (e.g., see "Electronic document data hiding technique using inter-character space", The 1998 IEEE Asia-Pacific Conf. On Circuits and Systems, 1998, pp. 419 – 422), a method of rotating a character to change its inclination (e.g., see Yasuhiro Nakamura & Kineo Matsui, "Digital Watermarking onto Japanese Documents by Seal Image", IPSJ Journal Vol. 38, No. 11, Nov. 1997), and the like are known.

However, since a document image has small redundancy, and the conventional methods proposed so far embed information by changing two variables, i.e., the baseline of a line, inter-word space, or rotation of a character, the changed points stand out (i.e., image quality deteriorates considerably). For this reason, embedding of information ~~to in~~ a document image may be detected by a third party.

Please replace all the paragraphs from page 3, line 6 to page 3, line 20 with the following:

That is, a preferred embodiment of an apparatus for embedding a digital watermark in a document image includes outer shape detection means for detecting circumscribing outer shapes of characters in a document image, the outer shapes including a first outer shape, a second outer shape that neighbors the first outer shape, and a third outer shape that neighbors the second outer shape. The apparatus further includes reference calculation means for setting a plurality of reference lines, the reference lines extending in a column direction and being spaced apart by a basic pitch in a row direction, the reference lines including a first reference line located between the first outer shape and the second outer shape and a second reference line located between the second outer shape and the third outer shape. The apparatus also includes control means for controlling at least one of the second and third outer shapes so that a distance between the first reference line and an edge of the second outer shape is different from a distance between the second reference line and an edge of the third outer shape, in accordance with digital watermark information to be embedded.

Please replace all the paragraphs from page 3, line 24 to page 4, line 11 with the following paragraph:

That is, a preferred embodiment of a method for embedding a digital watermark in a document image includes an outer shape detection step of detecting circumscribing outer shapes of characters in a document image, the outer shapes including a first outer shape, a second outer shape that neighbors the first outer shape, and a third outer shape that neighbors the second outer shape. The method further includes a reference calculation step of setting a plurality of reference

lines, the reference lines extending in a column direction and being spaced apart by a basic pitch in a row direction, the reference lines including a first reference line located between the first outer shape and the second outer shape and a second reference line located between the second outer shape and the third outer shape. The method also includes a control step of controlling at least one of the second and third outer shapes so that a distance between the first reference line and an edge of the second outer shape is different from a distance between the second reference line and an edge of the third outer shape, in accordance with digital watermark information to be embedded.

Please replace all the paragraphs from page 4, line 15 through page 5, line 6, with the following paragraph:

That is, a preferred embodiment of an apparatus for extracting a digital watermark embedded in a document image includes outer shape detection means for detecting circumscribing outer shapes of characters in a document image, the outer shapes including a first outer shape, a second outer shape that neighbors the first outer shape, and a third outer shape that neighbors the second outer shape. The apparatus further includes reference calculation means for setting a plurality of reference lines, the reference lines extending in a column direction and being spaced apart by a basic pitch in a row direction, the reference lines including a first reference line located between the first outer shape and the second outer shape and a second reference line located between the second outer shape and the third outer shape. The apparatus also includes extraction means for comparing a first distance, between the first reference line and an edge of the second outer shape, to a second distance, between the second reference line and an

edge of the third outer shape, and extracting data corresponding to a comparison result of the distances as data embedded using the first and second distances.

Please replace all the paragraphs from page 5, line 10 through page 6, line 2, with the following paragraph:

That is, a preferred embodiment of a method for extracting a digital watermark embedded in a document image includes an outer shape detection step of detecting circumscribing outer shapes of characters in a document image, the outer shapes including a first outer shape, a second outer shape that neighbors the first outer shape, and a third outer shape that neighbors the second outer shape. The method further includes a reference calculation step of setting a plurality of reference lines, the reference lines extending in a column direction and being spaced apart by a basic pitch in a row direction, the reference lines including a first reference line located between the first outer shape and the second outer shape and a second reference line located between the second outer shape and the third outer shape. The method also includes an extraction step of comparing a first distance, between the first reference line and an edge of the second outer shape, to a second distance, between the second reference line and an edge of the third outer shape, and extracting data corresponding to a comparison result of the distances as data embedded using the first and second distances.

Please delete all paragraphs from page 6, line 3 through page 14, line 18.

Please amend the paragraphs beginning on page 17, line 15 as follows:

Rectangles A1 to A7 and B1 to B7 indicate circumscribing rectangles of characters in a document image. Circumscribing rectangles A1 to A7 are those of characters of the A-th line in the document image. Likewise, circumscribing rectangles B1 to B7 are those of characters of the B-th line in the document image. These circumscribing rectangles are extracted using a document analysis technique.

Please amend the paragraph beginning on page 18, line 14, as follows:

In the following description, an m-th circumscribing rectangle from the leftmost ~~one~~ rectangle in Fig. 1, which is located in the n-th line from the uppermost ~~one~~ line in Fig. 1, may be expressed as circumscribing rectangle n-m. In Fig. 1, reference numeral 101 denotes a distance between the right edges of circumscribing rectangles A1 and B2; 102, a distance between the right edges of circumscribing rectangles A3 and B4; and 103, a distance between the right edges of circumscribing rectangles A5 and B6. As described above, the method of embedding a digital watermark data sequence according to this embodiment changes these distances in accordance with data to be embedded.